THE MINERAL INDUSTRY OF PENNSYLVANIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Pennsylvania Bureau of Topographic and Geologic Survey for collecting information on all nonfuel minerals.

In 1999, the preliminary estimated value[1] of nonfuel mineral production for Pennsylvania was $1.28 billion, according to the U.S. Geological Survey (USGS). This was about a 4% increase from that of 1998,[2] and followed a 2.5% increase in 1998 from that of 1997. The State rose in rank to 10th from 11th in the Nation in nonfuel mineral production value, of which Pennsylvania accounted for more than 3% of the U.S. total.

Pennsylvania continued to be among the Nation's leading States that produce crushed stone, portland cement, lime, and masonry cement (by descending order of value); these four commodities accounted for more than 88% of the State's total nonfuel mineral production value. In 1999, crushed stone led the State's increase in value with a $33 million gain, followed by dimension stone, up about $12 million, and portland cement up $11 million. Lime production and value showed a relatively small decrease, down about $3 million. In 1998, increases in value of $37 million for portland cement and $27.5 million for construction sand and gravel more than balanced out decreases of $32 million for crushed stone and $5.2 million for lime, resulting in a $30 million gain for the year. Other changes in value for both years were small relative to these and inconsequential to the net result (table1).

Based upon USGS estimates of the quantities produced in the 50 States in 1999, Pennsylvania remained 2d in crushed stone, 3d in portland cement, 4th of 4 States that produce tripoli, 6th in masonry cement, 8th in dimension stone, and 10th in common clay. The State rose to fifth from sixth in lime. Additionally, significant quantities of construction and industrial sand and gravel were produced in the State (descending order of value).

Pennsylvania is exclusively an industrial mineral- and coal-producing State; metals that were produced in the State in 1999, especially steel, were processed from materials acquired from foreign and other domestic sources. Pennsylvania continued to be the Nation's third leading raw-steel-manufacturing State, with an estimated output of almost 7.6 million metric tons (Mt) of raw steel, as reported by the American Iron and Steel Institute.

The following narrative information was provided by the Pennsylvania Bureau of Topographic and Geologic Survey [3]. According to the Pennsylvania Department of Environmental Protection (DEP) and the USGS, industrial mineral production in Pennsylvania appears to be on a steady annual increase. Based upon statistics compiled by the DEP, this production increase averaged approximately 15% per year over the past 4 years. More than 1,400 hectares (ha) of new or expansion land for industrial mineral production (including topsoil, borrow and fill, and dimension stone) were sought in 1999. Undoubtedly, much of this activity can be related to the continued support of Federal highway funding known as TEA-21.

Preliminary estimates from the DEP indicate another extraordinary year for most construction-related mining activities, accounting for more than 140 Mt (including topsoil, borrow and fill, and dimension stone). Crushed stone production estimates made by the USGS for 1998 amount to nearly 95 Mt (a 6% increase over 1997). Carbonate rocks continue to dominate both the type of rock mined and the lowest unit value mined. They also comprised the most sought minerals.

More than 1,000 ha in new crushed stone production capacity was sought in 1999, according to DEP. Approximately 690 ha were sought in western Pennsylvania where subhorizontal Carboniferous sediments predominate, while nearly 320 ha were applied for in the folded Paleozoic rocks and more populated area of eastern Pennsylvania. Four operators choose nearly 160 ha of sandstone to either expand or start grass roots operations, while seven operators submitted permit applications for the mining of 850 ha of carbonate rocks. Of note were a new high-friction sandstone source near the central portion of the State and a large underground limestone expansion in the western portion of the State.

The consolidation of the cement quarries in western Pennsylvania continues where thin layers of limestone are interspersed with coal, sandstone, and mudstone. Western Pennsylvania was also the focus of industry buyouts, with at least five carbonate properties changing hands; the most notable was the purchase of Commercial Stone Co., Inc. for an undisclosed sum by Better Minerals and Aggregates Co., formerly U.S. Silica Co.

According to the USGS, in 1998 sand and gravel production in the State increased 22% to over 19 Mt. However, sand and gravel exploration activity was confined to six operators in western Pennsylvania seeking more than 81 ha of new production, mostly in the glaciated northwestern portion of the State. Because most glacially derived sand and gravel deposits in Pennsylvania are confined to the less populated northwestern

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[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 1999 USGS mineral production data published in this chapter are preliminary estimates as of May 2000, and are expected to change. For some mineral commodities, such as, construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. A telephone listing for the specialists may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html, by using MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset (request Document #1000 for a telephone listing of all mineral commodity specialists), or by calling USGS information at (703) 648-4000 for the specialist's name and number. All Mineral Industry Surveys–mineral commodity, State, and country–also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals; facsimile copies may be obtained from MINES FaxBack.

[2]Values, percentage calculations, and rankings for 1998 may vary from the Minerals Yearbook, Area Reports: Domestic 1998, Volume II, owing to the revision of preliminary 1998 to final 1998 data. Data for 1999 are preliminary and are expected to change; related rankings may also be subject to change.

[3]Samuel W. Berkheiser, Jr., Chief, Geological Resources Division, authored the text of State mineral industry information submitted by the Pennsylvania Bureau of Topographic and Geologic Survey.

and northeastern portions of the State, manufactured sand from crushed stone helps to alleviate a sand and gravel shortage in the most populated southeastern portion of the State. Five sand and gravel operations representing nearly 360 ha changed ownership, the most significant was a 240-ha property in western Pennsylvania.

If limestone is the rock of choice for the crushed stone industry, then sandstone is the rock of choice for the building stone/dimension stone industry in the Commonwealth. Sixty-one new, 2 ha or less, dimension stone quarries submitted surface mining applications to DEP. Every application was for quarrying sandstone. The robust "bluestone/flagstone" industry in the northeastern corner of the State continues to expand and become more compliant with DEP; 49 operations sought mining permits. The other 12 mining applications represented colluvium and thicker bedrock sandstone opportunities, four were in the more densely populated eastern portion of the State.

The brick industry expanded its potential reserves by seeking two new clay/shale mining permits totaling about 100 ha. Landfill cover is also in demand as witnessed by the application to mine about 30 ha of shale in northwestern Pennsylvania by a single operator. New topsoil sources, used mainly for commercial agricultural blends with peat and sand, accounted for about 36 ha being sought by 11 operators. Most topsoil operations mine fine loam and silt in floodplain settings.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN PENNSYLVANIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1997 Quantity	1997 Value	1998 Quantity	1998 Value	1999 p/ Quantity	1999 p/ Value
Cement:						
Masonry	296	31,000 e/	319	31,000 e/	327	32,000 e/
Portland	6,360	420,000 e/	6,740	457,000 e/	6,900	468,000 e/
Clays: Common	839	2,740	886	2,270	891	2,210
Gemstones	NA	1	NA	1	NA	1
Lime	1,510	103,000	1,390	97,800	1,350	94,700
Peat	3	126	6	154	7	262
Sand and gravel: Construction	15,700	88,500	19,200	116,000	18,700	116,000
Stone:						
Crushed	89,200	536,000	94,500	504,000	98,000	537,000
Dimension metric tons	53,900	10,800	45,200	9,480	44,600	21,600
Combined values of clays (kaolin), sand and gravel (industrial), tripoli	XX	10,700	XX	11,800	XX	11,800
Total	XX	1,200,000	XX	1,230,000	XX	1,280,000

e/ Estimated. p/ Preliminary. NA Not available. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
PENNSYLVANIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1997 Number of quarries	1997 Quantity (thousand metric tons)	1997 Value (thousands)	1997 Unit value	1998 Number of quarries	1998 Quantity (thousand metric tons)	1998 Value (thousands)	1998 Unit value
Limestone 2/	122 r/	53,600 r/	$313,000 r/	$5.85	125	54,300	$303,000	$5.58
Dolomite	18 r/	12,600 r/	78,100 r/	6.18	19	17,500	82,900	4.74
Granite	7	4,210	28,500	6.76	7	3,710	19,000	5.11
Marble	1	390	2,370	6.07	1	W	W	6.01
Sandstone and quartzite	34 r/	5,990	35,400	5.90	37	7,100	37,800	5.32
Traprock	9	2,970	22,600	7.62	9	3,160	15,400	4.88
Slate	--	--	--	--	1	W	W	5.56
Miscellaneous stone	19	9,390	55,900	5.95	21	8,200	43,400	5.29
Total or average	XX	89,200	536,000	6.01	XX	94,500	504,000	5.34

r/ Revised. W Withheld to avoid disclosing company proprietary data, included in "Total." XX Not applicable. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes "limestone-dolomite" reported with no distinction between the two.

TABLE 3
PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 1998, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	421	$2,810	$6.68
Riprap and jetty stone	765	5,470	7.15
Filter stone	256	1,250	4.87
Other coarse aggregate	372	2,300	6.18
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,060	17,000	5.56
Bituminous aggregate, coarse	6,240	36,000	5.77
Bituminous surface-treatment aggregate	1,690	10,200	6.01
Railroad ballast	761	4,300	5.64
Other graded coarse aggregate	3,160	13,600	4.30
Fine aggregate (-3/8 inch):			
Stone sand, concrete	275	1,420	5.17
Stone sand, bituminous mix or seal	2,460	14,100	5.74
Screening, undesignated	1,330	5,790	4.34
Other fine aggregate	581	2,780	4.79
Coarse and fine aggregates:			
Graded road base or subbase	8,800	41,900	4.76
Unpaved road surfacing	1,720	8,240	4.78
Terrazzo and exposed aggregate	176	818	4.65
Crusher run or fill or waste	1,410	6,070	4.32
Other coarse and fine aggregates	6,050	25,700	4.25
Other construction materials	1,460	8,130	5.56
Agricultural: Agricultural limestone	395	2,300	5.82
Chemical and metallurgical:			
Cement manufacture	6,940	32,700	4.70
Lime manufacture	W	W	4.96
Dead-burned dolomite manufacture	W	W	3.34
Flux stone	126	518	4.11
Sulfur oxide removal	407	3,440	8.44
Special:			
Mine dusting or acid water treatment	W	W	15.31
Asphalt fillers or extenders	666	4,960	7.44
Whiting or whiting substitute	177	6,020	34.02
Other fillers or extenders	220	2,170	9.84
Roofing granules	438	1,450	3.31
Other miscellaneous uses: Other specified uses not listed	423	3,790	8.96
Unspecified: 3/			
Actual	29,700	163,000	5.49
Estimated	13,500	73,400	5.45
Total or average	94,500	504,000	5.34

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.
2/ Includes dolomite, granite, limestone, limestone-dolomite, marble, miscellaneous stone, quartzite, sandstone, slate, and traprock.
3/ Reported and estimated production without a breakdown by end use.

TABLE 4
PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1998,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:						
Coarse aggregate (+1 1/2 inch) 2/	3	22	231	1220	859	5,760
Coarse aggregate, graded 3/	77	620	W	W	5,210	33,400
Fine aggregate (-3/8 inch) 4/	36	292	347	1,630	1,130	6,340
Coarse and fine aggregate 5/	58	467	1,580	6,800	W	W
Other construction materials	--	--	W	W	448	2,550
Agricultural 6/	--	--	W	W	45	686
Chemical and metallurgical 7/	--	--	144	1,820	1,330	9,000
Special 8/	--	--	127	1,050	W	W
Other miscellaneous use	--	--	--	--	W	W
Unspecified: 9/						
Actual	1,860	10,300	3,710	20,500	3,770	20,400
Estimated	2,100	11,900	1,620	8,380	1,760	9,800
Total	4,140	23,600	8,480	45,300	19,400	115,000
	District 4		Unspecified districts			
	Quantity	Value	Quantity	Value		
Construction aggregates:						
Coarse aggregate (+1 1/2 inch) 2/	721	4820	--	--		
Coarse aggregate, graded 3/	8,950	43,600	W	W		
Fine aggregate (-3/8 inch) 4/	3,140	15,800	--	--		
Coarse and fine aggregate 5/	12,400	52,900	W	W		
Other construction materials	W	W	--	--		
Agricultural 6/	W	W	--	--		
Chemical and metallurgical 7/	6,470	28,100	--	--		
Special 8/	W	W	--	--		
Other miscellaneous use	W	W	--	--		
Unspecified: 9/						
Actual	20,400	112,000	--	--		
Estimated	7,990	43,300	--	--		
Total	62,500	320,000	15	90		

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
3/ Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface treatment aggregate, railroad ballast, and other graded coarse aggregate.
4/ Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregate.
5/ Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregates, unpaved road surfacing, and other coarse and fine aggregates.
6/ Includes agricultural limestone.
7/ Includes cement manufacture, dead-burned dolomite manufacture, flux stone, lime manufacture, and sulfur oxide removal.
8/ Includes asphalt fillers or extenders, mine dusting or acid water treatment, roofing granules, whiting or whiting substitute, and other fillers or extenders.
9/ Reported and estimated production without a breakdown by end use.

TABLE 5
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate	3,940	$27,000	$6.85
Plaster and gunite sands	25	289	11.56
Concrete products (blocks, bricks, pipe, decorative, etc.)	834	5,760	6.91
Asphaltic concrete aggregates and other bituminous mixtures	2,250	12,100	5.40
Road base and coverings 2/	1,350	7,190	5.33
Fill	629	2,590	4.11
Snow and ice control	202	980	4.85
Railroad ballast	5	45	9.00
Other miscellaneous uses 3/	990	4,890	4.94
Unspecified: 4/			
Actual	3,850	26,400	6.84
Estimated	5,150	29,200	5.67
Total or average	19,200	116,000	6.06

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
2/ Includes road and other stabilizations (lime).
3/ Includes filtration and roofing granules.
4/ Reported and estimated production without a breakdown by end use.

TABLE 6
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate	890	5,060	893	5,740	907	6,860	1,250	9,340
Concrete products 2/	W	W	95	1,010	482	2,810	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	408	2,180	875	4,650	W	W
Road base and coverings 3/	719	3,880	324	1,550	232	1,250	76	506
Fill	77	274	161	632	360	1,510	31	175
Snow and ice control	108	452	W	W	W	W	15	91
Other miscellaneous uses 4/	227	1,290	16	106	136	995	615	2,550
Unspecified: 5/								
Actual	903	5,860	W	W	W	W	459	2,130
Estimated	1,310	6,140	1,270	7,120	2,310	13,500	265	2,420
Total	5,280	28,800	3,700	22,800	7,330	45,900	2,920	18,900

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Includes road and other stabilizations (lime).
4/ Includes filtration, railroad ballast, and roofing granules.
5/ Reported and estimated production without a breakdown by end use.